Potential of biogas production from vegetable waste in Hanoi

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Introduction

Biogas recovery from municipal solid waste (MSW) especially from food waste would be a suitable selection to solve the problem of that kind of waste as well as energy crisis in Viet Nam. For this reason, studies on biogas recovery potential of food waste by anaerobic digestion (AD) would be a scientific basic to determine the optimal conditions for biogas recovery. This research aims to assess the potential of biogas recovery from vegetable wastes which were collected from central markets. The studied conditions on AD process were the effects of pH, temperature and supporting bacteria.

Material and Methods

Two types of vegetables (grocery morning and mustard green cabbage) collected from Bach Khoa market were used in this study. Collected vegetables were analyzed for pH, humidity, total solid (TS), volatile solid (VS). The AD experiments were then carried out by batch experiment in glass bottles with a volume of 500 mL or 5000 mL. A reactor bottle is placed in a water bath to control temperature (Figure 1). The AD reaction was conducted under different experimental conditions of pH, heating temperature, and supporting bacteria. Biogas yield was measured by water displacement method.

Results and Conclusions

Grocery morning (100g wet weight, 5.3g VS) was used in AD experiment with the retention time of 19 days. The results showed that, under the experimental conditions of pH = 6-8, heating temperature of 36-38 oC, and supporting bacteria, the volume of collected biogas (77 mL biogas/g VS) was higher that volume of biogas collected under other experimental conditions (Figure 2 (a)). That condition was applied for biogas recovery from mustard green cabbage (700 g wet weight, 40.1 g VS). The collected volume of biogas was 224 mL biogas /g VS (Figure 2(b)). The results showed the possible option for the biogas recovery from vegetable waste in Vietnam.

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**Figure 1.** Experimental procedure and setup for AD of vegetable in this study



**Figure 2.** Accumulative biogas of (a) Grocery morning and (b) Mustard green cabbage